

## CLAIMS

What is claimed is:

1. A system for establishing at least one operating parameter of a multiphase motor, comprising:
- 5 programming instructions stored in a tangible medium; and
- a processor operable to receive data and to process the data in response to the programming instructions,
- wherein the processor is operable to receive multiphase motor electrical input data
- 10 and represent the multiphase motor electrical input data as a balanced set of phasors with a positive sequence and a balanced set of phasors with a negative sequence,
- further wherein the processor is operable to establish motor output power based on the balanced set of phasors with a positive sequence and the balanced set of phasors with a negative sequence.
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2. The system as recited in claim 1, wherein the processor establishes a positive sequence motor output power based on the balanced set of phasors with a positive sequence and a negative sequence motor output power based on the balanced set of phasors with a negative sequence.
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3. The system as recited in claim 1, wherein the motor output power is the difference of the positive sequence motor output power and the negative sequence motor output power.
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4. The system as recited in claim 3, wherein the processor is operable to establish the efficiency of the motor based on the motor output power and electrical input power.

5. The system as recited in claim 1, wherein the multiphase motor electrical input data comprises input voltage, input current, and input power.

5 6. The system as recited in claim 5, wherein the input power is established from the input voltage and the input current.

10 7. The system as recited in claim 5, wherein the balanced set of phasors with a positive sequence comprises a balanced set of phasors with a positive sequence representing input current and a balanced set of phasors with a positive sequence representing input voltage.

15 8. The system as recited in claim 1, wherein the processor is operable to establish a plurality of motor electrical characteristic parameters based on the balanced set of phasors with a positive sequence, rotor speed data, stator resistance data, and stator temperature data.

20 9. The system as recited in claim 8, wherein the plurality of motor electrical characteristic parameters comprises electrical resistance of the rotor during operation of the motor.

10. The system as recited in claim 8, wherein the plurality of motor electrical characteristic parameters comprises stator inductance.

25 11. The system as recited in claim 8, wherein the processor is operable to establish a plurality of motor operating parameters based on the plurality of motor electrical characteristic parameters, the plurality of motor operating parameters comprising electrical current induced in the rotor.

12. The system as recited in claim 8, wherein the electronic device establishes the plurality of motor electrical characteristic parameters based on data obtained at a plurality of different load conditions of the motor, the data comprising the balanced set of phasors with a positive sequence, rotor speed data, and stator temperature.

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13. The system as recited in claim 8, comprising a first device operable to detect motor input voltage, motor input current, and input frequency.

14. The system as recited in claim 8, comprising a second device operable to detect the stator resistance.

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15. The system as recited in claim 8, comprising a third device operable to detect the rotor speed.

16. The system as recited in claim 8, comprising a fourth device operable to detect the motor temperature.

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17. A method of analyzing multiphase motor operation, comprising:  
obtaining stator electrical input data during operation of the motor;  
decomposing the stator electrical input data into a balanced set of phasors with a positive sequence and a balanced set of phasors with a negative sequence; and  
establishing the efficiency of the multiphase motor based on the balanced set of phasors with a positive sequence and the balanced set of phasors with a negative sequence.

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18. The method as recited in claim 17, wherein decomposing the stator electrical input data comprises decomposing stator input voltage data into a balanced set of voltage phasors with a positive sequence and a balanced set of voltage phasors with a negative sequence.

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19. The method as recited in claim 17, wherein decomposing the stator electrical input data comprises decomposing stator input current data into a balanced set of current phasors with a positive sequence and a balanced set of current phasors with a negative sequence.

20. The method as recited in claim 17, wherein establishing the efficiency of the multiphase motor comprises establishing a plurality of motor electrical parameters based on the balanced set of phasors with a positive sequence.

21. The method as recited in claim 20, wherein establishing the efficiency of the multiphase motor comprises establishing an output power of the motor.

22. The method as recited in claim 21, wherein an output power of the motor comprises establishing a first motor output power based on the positive sequence and the motor electrical parameters and a second motor output power based on the negative sequence and the motor electrical parameters, the output power being the difference of the first and second motor output powers.

23. The method as recited in claim 20, wherein the motor electrical parameters comprise rotor resistance.

24. The method as recited in claim 20, wherein the motor electrical parameters comprise magnetizing reactance.

25. The method as recited in claim 20, wherein the motor electrical parameters comprise core loss resistance.

26. The method as recited in claim 20, wherein the motor electrical parameters comprise rotor leakage reactance.

27. A system, comprising:  
5 means for obtaining multiphase electrical input data;  
means for decomposing the multiphase electrical input data into a positive sequence and a negative sequence; and  
means for establishing motor electrical parameters based on the positive sequence.

10 28. The system as recited in claim 27, comprising means for establishing a first output of the motor based on the motor electrical parameters and the positive sequence, and a second output of the motor based on the motor electrical parameters and the negative sequence.

15 29. The system as recited in claim 27, comprising means for establishing the efficiency of the motor based on the motor electrical parameters, the positive sequence, and the negative sequence.

30. A computer program, comprising:  
20 programming instructions stored in a tangible medium, wherein the programming instructions enable a processor to decompose multiphase electrical data into a positive sequence and a negative sequence and to establish the efficiency of a motor based on the positive sequence and the negative sequence.

25 31. The computer program as recited in claim 30, wherein the programming instructions utilize the method of symmetrical components to decompose the multiphase electrical data.

32. The computer program as recited in claim 30, wherein the programming instructions enable the processor to establish a plurality of motor electrical parameters based on positive sequence and rotor speed data obtained at a plurality of load points, and stator resistance.

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33. The computer program as recited in claim 32, wherein the programming instructions enable the processor to establish a motor output, the motor output comprising a first motor output based on the plurality of motor electrical parameters and the positive sequence and a second motor output based on the plurality of motor electrical parameters and the negative sequence.

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34. A computer program, comprising:

programming instructions stored in a tangible medium, wherein the programming instructions enable a processor to decompose multiphase electrical data into a positive sequence and a negative sequence and to establish at least one motor electrical characteristic based on the positive sequence.

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35. The computer program as recited in claim 34, wherein the programming instructions enable a processor to establish a positive sequence motor output power based on the at least one motor electrical characteristic and the positive sequence and a negative sequence motor output power based on the at least one motor electrical characteristic and the negative sequence.

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36. The computer program as recited in claim 34, wherein the programming instructions enable a processor to establish motor efficiency based on the positive sequence motor output power and the negative sequence motor output power.

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